

CLAIMS

- 1 1. A recording system for recording a high definition (HD) video onto a standard
2 definition (SD) compatible medium, comprising:
 - 3 a system for scaling down the HD video to an SD video format;
 - 4 a system for encoding the SD video;
 - 5 a system for extracting enhancement information from the HD video; and
 - 6 a system for storing the SD video and the extracted enhancement information onto
7 the SD compatible medium.
- 1 2. The recording system of claim 1, wherein the SD compatible medium comprises a
2 DVD.
- 1 3. The recording system of claim 1, wherein the system for encoding comprises an
2 MPEG-2 encoder.
- 1 4. The recording system of claim 1, wherein the enhancement information comprises
2 high frequency image data partitioned into different energy regions.
- 1 5. The recording system of claim 4, wherein enhancement information is stored in an
2 energy region map by a feature processing system.
- 1 6. The recording system of claim 5, wherein the energy region map is coded using a
2 quadtree decomposition algorithm.

1 7. The recording system of claim 1, wherein the SD video and the extracted
2 enhancement information are stored at a combined rate of approximately 5
3 megabits/second.

1 8. The recording system of claim 1, wherein the extracted enhancement information is
2 stored at a rate of less than 1 megabit/second.

1 9. The recording system of claim 1, further comprising an aspect ratio format system for
2 formatting the SD video for widescreen, letterboxing, and scan and pan formats.

1 10. The recording system of claim 1, wherein the SD video can be stored in a format
2 selected from the group consisting of: progressive and interlaced.

1 11. The recording system of claim 1, wherein the enhancement information is stored in
2 an MPEG userdata field.

1 12. A playback system for reconstructing a high definition (HD) video image from a
2 standard definition (SD) format recording, comprising:
3 a system for extracting and decoding SD data from the recording;
4 a system for extracting enhancement information from the recording;
5 a system for de-interlacing the decoded SD data; and
6 a system for up-scaling and post-processing the decoded SD data with the
7 enhancement information to generate the HD video image.

1 13. The playback system of claim 12, wherein the enhancement information comprises
2 information relating to high frequency image data extracted during a recording process.

1 14. The playback system of claim 13, wherein the enhancement information comprises
2 an energy region map.

1 15. The playback system of claim 14, wherein the energy region map is coded with a
2 quadtree decomposition algorithm.

1 16. The playback system of claim 14, wherein the post-processing system applies
2 adaptive peaking with a gain map derived from the enhancement information.

- 1 17. The playback system of claim 14, wherein the post-processing system applies
- 2 luminance transient improvement with a gain map derived from the enhancement
- 3 information.

1 18. A method for recording high definition (HD) video onto a standard definition (SD)
2 compatible medium, comprising:
3 scaling down the HD video to an SD video format;
4 encoding the SD video;
5 generating enhancement information from the HD video; and
6 storing the SD video and the enhancement information onto the SD compatible
7 medium.

1 19. The method of claim 18, wherein the step of generating enhancement information
2 includes:
3 extracting high frequency image data from the HD video; and
4 creating a energy region map based on the high frequency image data using a
5 quadtree algorithm.

1 20. The method of claim 18, wherein the enhancement information is stored in an MPEG
2 userdata field.

- 1 21. A method of reconstructing a high definition (HD) video image from a standard
2 definition (SD) format recording, comprising:
 - 3 extracting and decoding SD data from the recording;
 - 4 extracting enhancement information from the recording;
 - 5 de-interlacing the decoded SD data; and
 - 6 up-scaling and post-processing the decoded SD data with the enhancement
7 information to generate the HD video image.
- 1 22. The method of claim 21, wherein the enhancement information is stored in an MPEG
2 userdata field and comprises an energy region map coded with a quadtree decomposition
3 algorithm.
- 1 23. The method of claim 22, wherein the decoded SD data is post-processed by applying
2 adaptive peaking with a gain map derived from the enhancement information.
- 1 24. The method of claim 22, wherein the decoded SD data is post-processed by applying
2 luminance transient improvement with a gain map derived from the enhancement
3 information.

- 1 25. A program product stored on a recordable medium for recording high definition
- 2 (HD) video onto a standard definition (SD) DVD, comprising:
- 3 means for scaling down the HD video to an SD format video;
- 4 means for encoding the SD video;
- 5 means for generating enhancement information from the HD video, wherein the
- 6 enhancement data comprises high frequency image data; and
- 7 means for storing the SD format video and the enhancement information onto the
- 8 DVD.

- 1 26. A program product stored on a recordable medium for reconstructing a high
2 definition (HD) video image from a standard definition (SD) DVD, comprising:
3 means for extracting and decoding SD data from the DVD;
4 means for extracting enhancement information from the DVD, wherein the
5 enhancement information is stored in an MPEG userdata field and comprises high
6 frequency image data;
7 means for de-interlacing the decoded SD data; and
8 means for up-scaling and post-processing the decoded SD data with the
9 enhancement information to generate the HD video image.
- 1 27. The program product of claim 26, wherein the post-processing means applies one of
2 the group consisting of: adaptive peaking and luminance transient improvement, with a
3 gain map derived from the enhancement information.